UNITED STATES PATENT AND TRADEMARK OFFICE

UNITED STATES DEPARTMENT OF COMMERCE
United States Patent and Trademark Office
Address: COMMISSIONER FOR PATENTS
P.O. Box 1450
Alexandria, Virginia 22313-1450
www.uspto.gov

APPLICATION NO.	FILING DATE	FIRST NAMED INVENTOR	ATTORNEY DOCKET NO.	CONFIRMATION NO.
10/715,777	11/17/2003	George Borshukov	70086.00022	4553

58688 7590 03/17/2008
CONNOLLY BOVE LODGE & HUTZ LLP
P.O. BOX 2207
WILMINGTON, DE 19899

EXAMINER	
LIEW, ALEX KOK SOON	

ART UNIT	PAPER NUMBER
2624	

MAIL DATE	DELIVERY MODE
03/17/2008	PAPER

Please find below and/or attached an Office communication concerning this application or proceeding.

The time period for reply, if any, is set in the attached communication.

Office Action Summary	Application No.	Applicant(s)	
	10/715,777	BORSHUKOV ET AL.	
	Examiner	Art Unit	
	ALEX LIEW	2624	

-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE *3* MONTH(S) OR THIRTY (30) DAYS, WHICHEVER IS LONGER, FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136(a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133). Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

Status

1)☒ Responsive to communication(s) filed on *16 November 2007*.

2a)☒ This action is **FINAL**. 2b)☐ This action is non-final.

3)☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11, 453 O.G. 213.

Disposition of Claims

4)☒ Claim(s) *1-25* is/are pending in the application.

4a) Of the above claim(s) _____ is/are withdrawn from consideration.

5)☐ Claim(s) _____ is/are allowed.

6)☒ Claim(s) *1-12 and 16-25* is/are rejected.

7)☒ Claim(s) *13-15* is/are objected to.

8)☐ Claim(s) _____ are subject to restriction and/or election requirement.

Application Papers

9)☐ The specification is objected to by the Examiner.

10)☐ The drawing(s) filed on _____ is/are: a)☐ accepted or b)☐ objected to by the Examiner.

Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).

Replacement drawing sheet(s) including the correction is required if the drawing(s) is objected to. See 37 CFR 1.121(d).

11)☐ The oath or declaration is objected to by the Examiner. Note the attached Office Action or form PTO-152.

Priority under 35 U.S.C. § 119

12)☐ Acknowledgment is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).

a)☐ All b)☐ Some * c)☐ None of:

1.☐ Certified copies of the priority documents have been received.

2.☐ Certified copies of the priority documents have been received in Application No. _____.

3.☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

* See the attached detailed Office action for a list of the certified copies not received.

Attachment(s)

1) ☒ Notice of References Cited (PTO-892)
2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
3) ☐ Information Disclosure Statement(s) (PTO/SB/08) Paper No(s)/Mail Date _____.
4) ☐ Interview Summary (PTO-413) Paper No(s)/Mail Date. _____.
5) ☐ Notice of Informal Patent Application
6) ☐ Other: _____.

The amendment filed on 11/16/07 is entered and made of record.

Response to Applicant's Arguments

1. On pages 8 and 9 of the reply, the applicant argued the Geng (US pub 2003/0123713) teaches away from the subject matter in the pending application, specifically the applicant stated: [The Geng '713 publication concedes that "reflectance properties of the face are complex," and that "skin reflects light both diffusely and specularly." ... Moreover, the Geng '713 publication expressly teaches use of a three dimensional reflectance model, including the well known "bi-directional reflectance distribution function (BRDF)" ... Compare Pending Application No. 10/715,777, p. 2, l. 21 – p. 3, l. 7 (explaining that "methods employing the bi-directional reflectance distribution function (BRDF) ... are ... undesirable or unsuitable ...").]

The examiner would like to point out what is claimed in claim 1, "... defining modeled light reflected from the surface geometry of the digital object in a modeled light environment" includes all the light reflectance models discussed in the current application on pages 2 and 3 because the applicant did not make an effort to define the model in claim 1 differentiating the desired model against those models discussed on pages 2 and 3 of the specification. Although the models (bi-directional reflectance distribution function, bidirectional surface scattering distribution function or Monte Carlo) discussed in the current specification are computationally expansive, they are still functions which model the reflectance properties of computer generated objects. In addition, the digital object claimed in claim 1 includes other materials other than skin.

2. The exhibits, A-K, submitted by the applicant are considered. The examiner recognizes the purpose of the blurring technique used in the current invention and withdraws the Gallagher reference for claim 1. In the examiner's updated search, Arias (US pat no 5,966,134) discloses blurring the light intensity matrix, thereby producing a blurred matrix (see column 11, lines 7 to 15, the frame is read as matrix; the frame is FB2 is blurred with a filter shown on column 11, lines 17 to 20). One skilled in the art would include blurring a matrix because to thickens edge in the 2D image to improve the visibility of the image.

Claim Objections

Claims 13 – 15 are objected to as being dependent upon a rejected base claim, but would be allowable if rewritten in independent form including all of the limitations of the base claim and any intervening claims.

DETAILED ACTION

Claim Rejections - 35 USC § 103

1. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

> (a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negatived by the manner in which the invention was made.

2. Claims 1 – 5, 8, 9, 11 and 16 – 25 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wolfe (titled: "Teaching Texture Mapping") in view of Geng (US pub no 2003/0123713) and Arias (US pat no 5,966,134).

With regards to claim 1, Wolfe discloses a method for rendering a digital object, the method comprising:

receiving information defining a digital object, wherein the digital object comprises a computer-generated three-dimensional surface geometry (see slide 17, the teapot is a computer generated 3D object);

generating a two-dimensional matrix, each matrix entry mapped to a unique surface element of the surface, each matrix being a lumel mapped to the surface element of the digital object (see slide 18. there are six 2D texture map each representing all the sides of the teapot); and

rendering the digital object, using matrix entries (see slide 21).

Wolfe does not disclose wherein the information is sufficient for defining modeled light reflected from the surface geometry of the digital object in a modeled light environment. Geng discloses sufficient information for defining modeled light reflected from the surface geometry of the digital object in a modeled light environment (see figure 5 and 6). One skilled in the art would include a reflectance light model because to combined the plurality of texture maps shown in figure 6 of Geng to create an accurate three-dimensional image of the face.

Wolfe and Geng do not disclose blurring the light intensity matrix. Arias discloses blurring the light intensity matrix, thereby producing a blurred matrix (see column 11, lines 7 to 15, the frame is read as matrix; the frame is FB2 is blurred with a filter shown on column 11, lines 17 to 20). One skilled in the art would include blurring a matrix because to thickens edge in the 2D image to improve the visibility of the image. The combination of Wolfe, Geng and Arias disclose the claimed invention of claim 1.

With regards to claim 2, Geng discloses computing a modeled light intensity for each matrix entry using detailed skin topographical data (see figure 5 and 6).

With regards to claim 3, Wolfe discloses bump mapping a computer generated digital object (see slide 18); Geng discloses processing the detailed skin topographical data (see figure 5 and 6). See motivation for claim 1 for combing Wolfe and Geng.

With regards to claim 4, Geng discloses a method of claim 2, further comprising obtaining the detailed skin topographical data by measuring a three-dimensional structure of a skin surface sample (see figure 21, the camera obtains the depth information of the shape of the face, paragraph 21).

With regards to claim 5, Geng discloses a method of claim 1, wherein the rendering step further comprises using color values from a color map to determine pixel color

values for the digital object (see paragraph 56, each pixel in the three-dimensional image obtains a final color value).

With regards to claim 8, Arias discloses blurring step further comprises convolving the light intensity matrix (see column 11, lines 7 to 15).

With regards to claim 9, Geng and Gallagher disclose all of the claim elements / features as discussed above in rejection for claim 1 and incorporated herein by reference, but fail to disclose processing the light intensity matrix using a Fast Fourier Transform. However, it is well known in the art of image analysis / processing to process any two dimensional image with Fast Fourier Transform (MPEP 2144.03). One skill in the art would include Fast Fourier Transform in blurring process because the transformed images does not have to use convolution to filter images, where convolution operation includes multiplications and additions, in Fourier domain the image representations include one step multiplication to filter images.

With regards to claim 11, Geng discloses a step of generating a light intensity three-dimensional image for each of three colors separation channels (see paragraph 56), but does not disclose a two-dimensional matrix for filtering. Arias disclose a two-dimensional matrix for filtering. One skill in the art would filter / blur a two dimensional image over a three dimensional image is because to save processing time, where

processing a three-dimensional image will take n times longer to process, where n is the number of depth information in the three dimensional image.

With regards to claim 16, see the rationale and rejection for claim 1.

With regards to claim 17, see the rationale and rejection for claim 8. The blurring algorithm is performing convolution on the input image of the face and filter kernel.

With regards to claim 18, see the rationale and rejection for claim 5.

With regards to claim 19, see the rationale and rejection for claim 5.

With regards to claim 20, see the rationale and rejection for claim 1. In addition, Geng in figure 5 and 6, obtaining color images of the face from different lighting condition.

With regards to claims 21 and 23, see the rationale and rejection for claim 1. In addition, Geng discloses a computer system which contains memory, CPU (CPU requires instructions to process data) and display (figure 10) to perform functions in claim 21. One skilled in the art would include a computer system because to avoid manual computations which save time.

With regards to claim 22, Wolfe discloses generating a second matrix of values representing surface from the object, wherein generating pixel values of an image of the object further comprises using the second matrix of values representing surface from the object (see slide 18, each element in each of the six matrixes are pixels; there are six matrixes so there is a 'second matrix' available).

With regards to claim 24, Geng discloses a computer memory storing a two-dimensional matrix of values representing specular surface reflection from the object (see figure 5 and 6; data are stored in computer shown in figure 10), wherein the processing unit is programmed with instructions for rendering the object using the two dimension color map (the CPU is read as the processing unit).

With regards to claim 25, see the rejection and rationale for claims 1 and 21.

3. Claims 6 and 7 are rejected under 35 U.S.C. 103(a) as being unpatentable over Wolfe in view of Geng ('713) and Arias ('134) as applied to claim 1 further in view of Gatti (US pub no 2002/0009224).

With regards to claim 6, Wolfe discloses all of the claim elements / features as discussed above in rejection for claim 1 and incorporated herein by reference, but fails to disclose mip mapping to two dimensional image. Gatti performs MIP mapping to two-dimensional image to obtain three-dimensional image (see paragraph 43, mip mapping

is discussed on page 15 lines 9 – 12 of the specification of the current invention). One skill in the art would use MIP mapping to obtain three-dimensional image from two-dimensional is because to obtain more detailed surface shape of the face object to improve color recognition of the skin.

With regards to claim 7, see the rationale and rejection for claim 5.

4. Claim 12 is rejected under 35 U.S.C. 103(a) as being unpatentable over Wolfe in view of Geng ('713) and Arias ('134) as applied to claim 1 further in view of Wober (US pat no 5,748,792).

Wolfe discloses all of the claim elements / features as discussed above in rejection for claim 11 and filtering three dimensional image with Gabor filter (see paragraph 67 and 68), but does not explicitly disclose whether it is done in the spatial domain, by convolving the spatial three dimensional image with h(k), or the Fourier domain, by multiplying the frequency information of the three dimensional image with the frequency information of the filter window. Wober discloses multiplying the input image with a plurality of filters in the Fourier domain (see fig 16 – the input image is multiplied by three different filters, H1, H2 and H3, independently, also see col. 6 lines 34 – 52). One skill in the art would include multiplying filter image with input image because the transformed images does not have to use convolution to filter images, where convolution operation includes multiplications and additions, which takes more time, in

Fourier domain the image representations include one step multiplication to filter images, which save processing power and time.

5. Claim 10 is rejected under 35 U.S.C. 103(a) as being unpatentable over Wolfe in view of Geng ('713) and Arias ('134) as applied to claim 1 further in view of Gallagher (US pat no 6,400,848).

With regards to claim 10, Wolfe discloses all the limitations discussed in claim 1, but does not disclose blurring filter does not include a Gaussian filter. Gallagher discloses blurring step further comprises executing a blurring algorithm of the form exp $(-(x^2 + y^2)/\sigma)$, where x and y are the horizontal and vertical widths, respectively, of the blur kernel in number of lumels, exp is the base of the natural logarithm, and σ is the spreading parameter (the form exp $(-(x^2 + y^2)/\sigma)$ is a Gaussian filter, which is shown in fig 5 – S100). One skilled in the art would include a Gaussian filter because user may select the size of the Gaussian kernel during filtering, which may be tested and the kernel with the best results are selected.

Conclusion

Applicant's amendment necessitated the new ground(s) of rejection presented in this Office action. Accordingly, **THIS ACTION IS MADE FINAL**. See MPEP § 706.07(a). Applicant is reminded of the extension of time policy as set forth in 37 CFR 1.136(a).

A shortened statutory period for reply to this final action is set to expire THREE MONTHS from the mailing date of this action. In the event a first reply is filed within TWO MONTHS of the mailing date of this final action and the advisory action is not mailed until after the end of the THREE-MONTH shortened statutory period, then the shortened statutory period will expire on the date the advisory action is mailed, and any extension fee pursuant to 37 CFR 1.136(a) will be calculated from the mailing date of the advisory action. In no event, however, will the statutory period for reply expire later than SIX MONTHS from the date of this final action.

Any inquiry concerning this communication or earlier communications from the examiner should be directed to ALEX LIEW whose telephone number is (571)272-8623. The examiner can normally be reached on 9:30AM - 7:00PM.

If attempts to reach the examiner by telephone are unsuccessful, the examiner's supervisor, Matthew Bella can be reached on (571) 272-7778. The fax phone number for the organization where this application or proceeding is assigned is 571-273-8300.

Information regarding the status of an application may be obtained from the Patent Application Information Retrieval (PAIR) system. Status information for published applications may be obtained from either Private PAIR or Public PAIR. Status information for unpublished applications is available through Private PAIR only. For more information about the PAIR system, see http://pair-direct.uspto.gov. Should you have questions on access to the Private PAIR system, contact the Electronic Business Center (EBC) at 866-217-9197 (toll-free). If you would like assistance from a USPTO Customer Service Representative or access to the automated information system, call 800-786-9199 (IN USA OR CANADA) or 571-272-1000.

/Matthew C Bella/
Supervisory Patent Examiner, Art Unit 2624

Alex Liew
AU2624
3/3/08